Utah Department of Health Interoperability Needs Assessment

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An Assessment of Current and Desired Exchange Capabilities and Interoperability of Key UDOH Information Systems

Interoperable systems share information and processes to efficiently deliver integrated services to the client community. The term "Interoperability" is sometimes used or refers to the ability of two or more systems or components to exchange information and to use the information to make better decisions. The term is often used in a technical engineering sense and also in a broader sense, taking into account social, political, and organizational factors that impact performance.

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I. Executive Summary

The collection and use of high quality health information is integral to the mission and operations of the Utah Department of Health (UDOH). Currently, UDOH has numerous ongoing innovative projects that support the collection, storage, and use of individual and population-based data to support core public health functions such as disease surveillance, health care statistics, (quality measures), and more. However, in order to fulfill the population-based and patient-centric missions of public health, the literature has stated that it will be pertinent for health care providers and local and state health agencies to be capable of exchanging pertinent information about individuals and the communities they serve.

Therefore, as part of the State Innovation Model Grant, the health department conducted a UDOH interoperability and analytics needs assessment from February to June 2016. The assessment included three distinct activities: 1) an assessment of twenty-three key [Appendix A] UDOH public health information systems that are aligned to ongoing innovative projects; 2) key informant interviews; and 3) National Information Exchange Model (NIEM) Readiness Assessment[1].

Summary of Finding and Recommendations

During the activities below several themes were identified including the following:

- There is high variability in the methods used by UDOH systems to collect and report data. This variability is particularly seen when assessing Division of Control and Prevention (DCP) and the Laboratory systems. Both collect or report data through some method of non-electronic exchange; this is mostly due to the capabilities or preference of the exchange partners.
- The methods used for electronic exchange are mostly: web-based data entry, secure-email, SFTP, or an interface engine [Mirth or Rhapsody]
    - Mirth is used by heavily by TRISANO and Utah Statewide Immunization Information System (USIIS)
    - Rhapsody is mostly used by Child Health Advanced Records Management (CHARM) and the various Laboratory Information Management System (LIMS) systems used by the UDOH's LAB. Both system mangers discussed plans to move their interfaces to MIRTH. Currently the LAB is working on a detailed plan for this switch.
    - USIIS is UDOH's leader in developing and managing HL7 Interfaces
        - Currently in Production: 558 provider facilities
        - Private providers: 357
        - Local Health Department: 41
        - Federally Qualified Health Center: 34

[1] For specific information on resources referenced in this guide or for more information about NIEM, please visit the NIEM website: NIEM.gov.

    - Pharmacies: 126
    - Electronic Health Record (HER) HL7 systems interfaces: 43
- There is also variability of interoperability levels both between information systems and within any particular information system; interoperability levels ranged from 2-4 — no systems operated at a level 1[2]. Often interoperability is limited by the capabilities of exchange partners; this is seen particularly with the DCP group where they are unable to achieve a high level interoperability between TRISANO and CDC programs, such as The Enhanced HIV/AIDS Reporting System (eHARS), because of interoperability limitations of the provided CDC program.

- In terms of data exchange, many systems link, merge, or exchange data with another internal system. The Office of Vital Records and Statistics systems were the most common system that UDOH currently links with. However, the exchange or link varies from a manual process to interoperability level 4. The systems that had the capacity to link or exchange data at an interoperability level 3 or 4 were CHARM, USIIS, EDEN/UMED, and TRISANO. Many interviewees hope the Master Person Index (MPI) can help with this process and also believe that a UDOH MPI would influence the number of systems they exchange with.

- There is a strong desire at UDOH to improve exchange capability both with internal and exchange partners. Interviewees noted that interoperability would facilitate data access, promote timely decision-making, increase efficiencies in data use, and enable complex analyses. Requests for internal exchange partners were largely for the exchange of Vital Records (EDEN and UINTAH), the All Payer Claims Database (APCD), Emergency Department (ED), Department of Health Master Person Index (DOHMPI), USIIS data. Of these data sets 5 out of the 6 systems operate at a high level of interoperability. The ED data is currently at a Level 2; however, Office of Health Care Statistics (OHCS) does have immediate plans to modernize the Hospital Discharge System and hope to have it at a Level 3 within the next 12 months. However, the lack of ED timely data was expressed as a concern by many interviewees who were interested in this data exchange.

- For external exchange, interviewees were largely interested in clinical, patient level data; therefore, exchange with health systems and the cHIE were desired

- Many interviewees felt that that UDOH has the technical infrastructure to support data exchange, but many challenges/barriers exist including the lack of UDOH strategy, too many data sharing agreements, and various resource needs within UDOH (including funding, staff, staff skill set). This finding was quantified by the NIEM Readiness Assessment activity.

- While technical infrastructure was deemed to be adequate, interviewees did mention the need for more collaboration access the health department to reduce duplication and redundancies. In line with this topic, several interviewees mentioned the need of a potential UDOH common data model to help standardize data elements across systems, and many stressed the benefits to promoting shared solutions, such as

[2] Description of the levels can be found in Section IV.

platforms, applications, and services, within the agency. These shared solutions can include:
    - The Master Person Index
    - The Directory of Clinicians
    - Shared applications such as the SAS Analytics Server

- Many interviewees felt that Indicator-Based Information System (IBIS) is a great resource to disseminate data; however, would like the process of sharing data to be less manual, and when possible, more timely.

- Very few interviewees utilize advance business intelligence (BI) and advanced analytics tools due to lack of understanding of how to use such tools to visualize the data in a meaningful way.

- There's strong support by DTS Application Manager to integrate UDOH data sources for complex public health analyses.

The results identified the need for following:

- UDOH need to work in a coordinated approach to system enhancements toward better integration and interoperability both within and external to UDOH. Such coordinated approach includes:

    - An agency-wide coordinated integration and interoperability plan

    - Designation of lead personnel or a team to oversee integration and interoperability efforts at UDOH

    - Learn and build on lessons learnt from other UDOH programs. A forum to share such information, such as the Informatics Networking Meeting or the Informatics Brownbag, would be useful. For example, a potential topic can be related to The Healthy Living through Environment, Policy, and Improved Clinical Care Program (EPICC) initiative to collect clinical data from health systems for population health analysis.

    - Work with different programs to leverage solutions that are available today, for example, the LAB should work closely with DCP informatics team to potentially use common Mirth interfaces

- During the data discovery process it became evident that a clear, consistent picture of data across UDOH was absent. While it is expected to find this at some level, many interviewees expressed that they have very little knowledge of what data exists within the UDOH and how it is used across the department. Such lack of knowledge can be a hindrance for interoperable information exchanges. Therefore, developing or identifying a metadata management tool that captures the Meta Data of each UDOH system will be a crucial for improving interoperability and data integration with both internal and external partners.

- As mentioned earlier, a UDOH common data model can guide how data is captured at UDOH and enable interoperable UDOH systems and allows data requirements in

a single very manageable and sharable technology. Unlike many other health departments, UDOH innovative nature resulted in many home-grown systems, thus making it easier to adopt such a model. Also, many UDOH systems contain various standardized terminologies such as ICD-9, ICD-10, CPT, and more. Therefore, to ensure drugs and conditions are represented within the common data model a terminology dictionary should also be created to store the individual concepts from selected medical terminologies.

- On a related note on terminology management, many systems manage their terminologies locally through a manual process, therefore, UDOH can benefit from the adoption of a terminology server. A terminology server reduces duplication of current efforts and time taken to update these databases. In addition, it can help achieve interoperability by delivering a set of services and functions to map, manage, mediate, and manipulate terminologies for use and re-use in clinical applications.

- Many interviewees felt that funding plays an important role for interoperable systems at UDOH. Therefore, it was recommended by many that UDOH should stress the need to include IT infrastructure development apart of grant budget. Also, UDOH should consider incorporating language into technology contracts that authorizes the reuse of components for other programs.

- Template repository: a place where templates related to project management such as business cases, user stories, etc., was a need that echoed throughout the assessment.

- Data interoperability and integration allows access to a plethora of integrated data set for analysis and reporting. However, many UDOH interviewees do not have the power analytical skills required for such analysis. Therefore, training on how to use BI and other relevant analytics tools, to support decision making will greatly benefit UDOH.

II. ACRONYMS

APCD	All Payer Claims Database
BI	Business Intelligence
CHARM	Child Health Advanced Records Management
CHIE	Clinical Health Information Exchange
DCP	Division of Control and Prevention
DTS	Department of Technology Services
dohMPI	Department of Health Master Person Index
EDEN	Electronic Death Entry Network
ehars	Enhanced HIV/AIDS Reporting System
EPICC	The Healthy Living through Environment, Policy, and Improved Clinical Care Program (EPICC)
HIT	Health Information Technology
HL7	Health Information Level 7
HER	Electronic Health Record
IBIS	Indicator-Based Information System
LIMS	Laboratory Information Management System
NIEM	National Information Exchange Model
OHDS	Office of Health Data and Security
OHCS	Office of Health Care Statistics
SFTP	Secure File Transfer Protocol
SIM	State Innovation Model Grant
UDOH	Utah Department of Health
UINTAH	Utah Birth Registry
UMED	Utah Medical Examiners Database
USIIS	Utah Statewide Immunization Information System

III. Background and Business Needs

The collection and use of high quality health information is integral to the mission and operations of the Utah Department of Health (UDOH). Currently, UDOH has numerous ongoing innovative projects that support the collection, storage, and use of individual and population-based data to support core public health functions such as disease surveillance, health care statistics, (quality measures), and more. However, in order to fulfill the population-based and patient-centric missions of public health, the literature has stated that it will be pertinent for health care providers and local and state health agencies to be capable of exchanging pertinent information about individuals and the communities they serve.

Over the past several years there has been a national push to promote a movement towards modernizing public health information infrastructure and systems to be more standards-based and interoperable - this is seen in the passage of the Health Information Technology for Economic and Clinical Health (HITECH) Act and the Office of National Coordinator Federal Health IT Strategic Plan 2015-2020. If the intentions of HITECH and other initiatives are fully realized, then there will be a greatly increased flow of health data between and within entities, including health departments. However, in order to chart a path to a modern public health enterprise it is first necessary to understand the current informatics capabilities already being used at health departments and identify the needs that exist.

While inventorying datasets and information systems at UDOH has been done over the years, they do not contain the necessary information needed to help the department identify and assess key information to support the development of an agency-wide plan around interoperability and electronic exchange with key stakeholders. As a result, there is a compelling business need for UDOH to conduct a current state assessment of key information systems to better understand exchange capabilities and utilization of standards and to create plans for progress towards improved exchange capabilities. Moreover, if the goal of UDOH is to ensure maximum coordinate and effective use of the data collected such an assessment project would be the first step in addressing that goal and would be support the Utah Health IT Vision, Principles, and Priorities:2015-2020:

1. Improve system interoperability and portability
2. Educate and promote the use of nationally developed standards
3. Strengthening Information Stewardship
4. Enhance IT Systems
5. Improve the Ability to Electronically Exchange Data
6. Strengthen IT Governance and Organizational Capacity

Purpose and Objectives

The purpose of the UDOH interoperability and integration profile project is to capture a current state assessment of key UDOH public health information systems that are aligned to ongoing innovative projects and to assess:

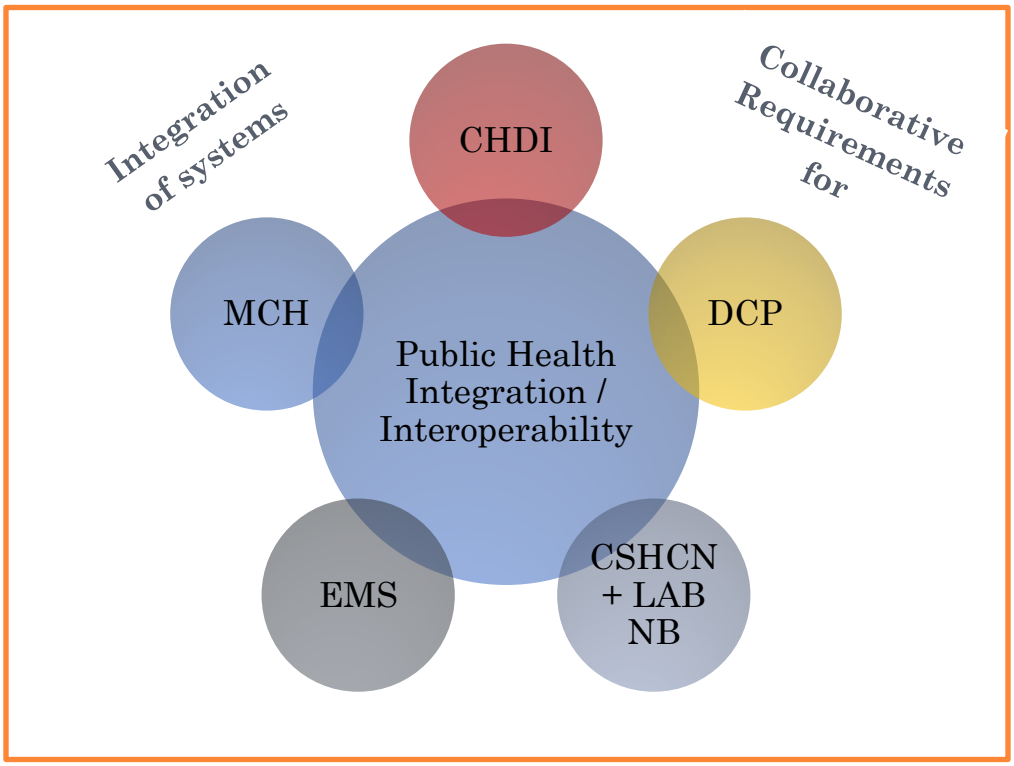
- High level functionality of public health information systems at UDOH with special emphasis on exchange capabilities and utilization of standards

- Barriers and future opportunities for how these information systems can be modernized to become more interoperable with internal divisions.

Preliminary Scope

The scope of this project includes a focused effort on working with key UDOH stakeholders for developing collaborative information system interoperability requirements for UDOH. See the figure below for a high-level view of the stakeholders involved and needed efforts.

Figure 1: Depiction of Collaborative Requirements -Stakeholders and Efforts



*Note: Recognizing there are too many needs for any one group to tackle at once, this project would start with a big picture view of the needs and then determine where to focus resources using a coordinated approach by involving the right stakeholders.

Methodology and Activities

The data for the needs assessment was collected through in-person focus group, one-on-one interviews and notes taken in attendance of the Meaningful Use: Lessons Learnt Informatics Brown Bag.

To accomplish the above goal the following activities were conducted:

	Activity	Outcome
1	Cluster projects related to UDOH Strategic Plan Goals	Clustered innovative UDOH projects related to UDOH Strategic Plan Goals, "Health Information Technology (HIT) Strategic Integration Matrix" document, and created a Word Cloud to visually show what was requested the most. See Appendices B and C respectively. The clusters highlighted that many programs where involved in one of the following activities: 1. Information Exchange and/or Integration 2. Security 3. System Updates The word cloud showed that many groups were interested in working with cHIE, updating current systems and data access and integration.
2	Conceptual Framework for UDOH Interoperability assessment	Developed conceptual framework diagram, which helps to visually depict the different data collection dimensions [to emphasize partners in data collection (including where data comes from and how it is collected), information system applications to support the flow of data to/from UDOH, and partners in data reporting (including where data goes and how it is sent)] to help develop the questionnaire for the UDOH interoperability assessment. Appendix D.
3	Developed the interoperability instrument	The interoperability assessment tool was developed in REDCap and was based on Minnesota's Informatics Profile Questionnaire and the Levels of Information Systems Interoperability (LISI)[3]. Recognizing its multi-faceted nature and both technical and non-technical imperatives, LISI articulated four aspects of interoperability, described below [the definition below are slightly modified to better reflect the public health sectors]: 1. Policies: The procedures and practices that enable systems to exchange information, capabilities, and services.

[3] C4ISR Architecture Working Group. "Levels of information systems interoperability (LISI)." *US DoD* (1998).

		2. Infrastructure: The hardware, networking, and staffing that enables system interaction. 3. Data & Standards: The information formats and protocols that enable the exchange of data and information. 4. Applications: The tools used by the health workforce to enable the exchange, processing, and analysis of information. To assess capacity for the four aspects of interoperability, subtopics reflecting specific issues related to those aspects were identified and used as the basis for questions. This resulted in the following categories: 1. DESCRIPTION AND PURPOSE 2. INFORMATION COLLECTION AND REPORTING 3. DATA REPRESENTATION AND INTEGRATION 4. DATA MANAGEMENT AND QUALITY 5. POLICIES, PROCEDURES, AND SECURITY 6. IS INTEROPERABILITY 7. FUTURE NEEDS FOR INTEROPERABILITY 8. ANALYTICS For a copy of the assessment tool please contact Kailah Davis at kdavis@utah.gov.
4	Identified systems and Interviewed data stewards	Conducted high level data inventory for each program (at the program level rather than data set level) and link to strategic goals projects. Below is the methodology for identifying systems. Data collected as part of inventory projects, REDCap DOHSI and HA Catalog, by UDOH provided a baseline of information which was analyzed and synthesized to create logical groupings of data sets. The two inventories had a total of 147 distinct applications or systems. The systems were then analyzed to exclude systems the following: 1) Exclude DMHF systems/applications (29) 2) Exclude systems that are hosted externally (5) 3) Exclude systems/applications that are (79): a. supplemental support for health

		systems such as wikis b. Analytics software such as SAS Analytics c. Discontinued applications and/or historical databases d. Portals e. Messaging systems and interfaces 4) Exclude unknown applications or no description (3) 5) Exclude survey system (1) Out of the 30 systems, mapped systems to projects in the "HIT Integration Matrix", this resulted in 23 systems to assess, Appendix A. After each interview, data collected were entered into the REDCap system.
5	Conducted CHDI Focus Group	A CHDI focus group was conducted and 12 participants attended. The goal of the focus group was to conduct collaborative requirements gathering to identify ways interoperability projects can be more successful at UDOH. Further, the agenda was developed with the goal of learning from others and enhancing participants' ability to act as change agents for interoperability and integration in their respective projects. As a result, the agenda was drafted with the following topics for discussion generations: • Current CHDI data projects • Planning effectively used and well-designed systems • Personnel and Project Management techniques • The challenges, barriers and opportunities for data exchange
6	Participated in the BHP Informatics/Clinical Data Workgroup	During participation documented: • Barriers and challenges the group currently experiences • Worked with the group to develop logic model to determine the group activities and outcomes
7	Attended the brownbag panel discussion on Public Health Information Exchange with Providers	Recoded session and documented lessons learnt and strategies used by different programs to exchange data with providers. The topics discussed were: 1. EHR Incentives for Medicaid Providers 2. Meaningful Use: Immunization

		3. Meaningful Use: Syndromic Surveillance 4. Meaningful Use: Electronic Laboratory Reporting 5. Meaningful Use: Caner Registry 6. Clinical Data Needs for Population Health Collaboratives 7. Emergency Medical Services Connection to cHIE 8. Newborn Hearing Screening Results &Diagnostics Reports Exchange
8	Interviewed key personnel	In addition to the interoperability self-assessment previously described, conducted a series of key informant interviews. Each interview had different objectives, but the overall goal was similar to other activities- discuss the challenges, barriers and opportunities for data exchange. The interviewees for this activity were: 1. Jeffrey Duncan--- to discuss future of the UDOH MPI 2. Laurie Baksh – what health analysis would be enabled by data exchange/interoperability 3. Jim Howard and Cameron Cooper- to discuss the perceived role of DTS and OHDS in internal data exchange
9	Synthesized Information	Used information gathered in the activities 4-8 to appropriate themes, identify data stewards needs and provide actionable recommendations (both practical and based on sound informatics principles. A summary of such recommendation was provided in the executive summary; after the planning grant, will build up the foundation laid by the grant to work on a detailed health integration plan.
10	Modified NEIM Readiness Assessment Phase for UDOH	With data gathered, conducted an assessment using a modified version of National Information Exchange Model (NIEM) Readiness Assessment tool to quantify UDOH's readiness for system interoperability and exchange. This process focuses on analysis of 4 criteria – Business Need, Stakeholder Community, Planning Process, and Technical Capability. The set of charts presented below are results from the NIEM readiness assessment. As depicted in the charts, NIEM readiness, as it would relate to the Business Need and Technical Capabilities, is at an acceptable maturity level. The Planning Process and Stakeholder Community are two areas that are

		lacking, and where steps need to be taken to get to an acceptable state. For a detailed draft of the NIEM readiness assessment that was conducted for UDOH, please see contact Kailah Davis at kdavis@utah.gov.

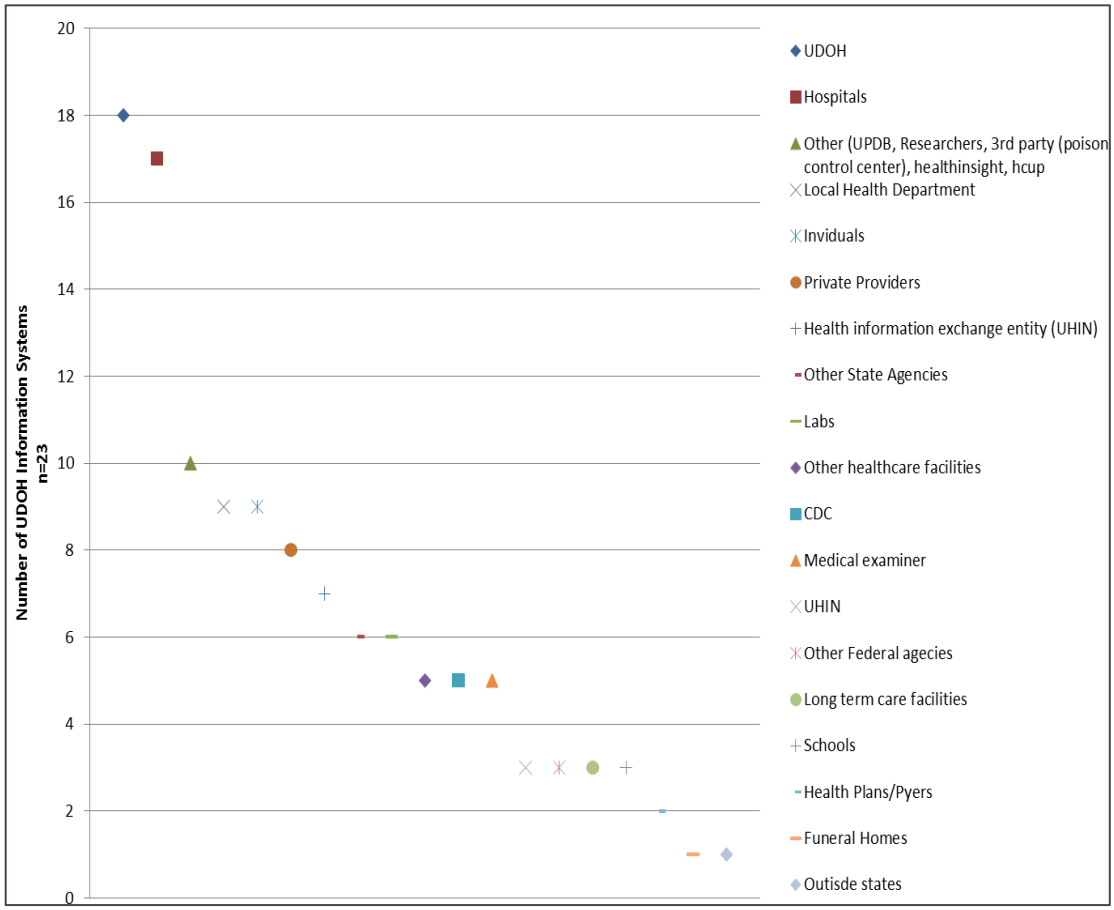
IV. Interoperability Assessment

The analysis of the data revealed a strong desire (100%) by programs to improve exchange capabilities with their stakeholders. The data also indicated great variability in UDOH information systems as it relates to exchange capabilities, interoperability levels, readiness for exchange, and barriers/opportunities for system modernization. The following pages present more of the results in detail.

Current and Desired Information Exchange Partners

There are a lot of similarities in the types of information exchange partners UDOH systems have, with the top exchange partners being hospitals, private providers, laboratories, other programs within UDOH and Local Public Health. Less common exchange partners include: individuals, other Federal agencies, long-term care facilities, other states, health plans/payers, medical examiners, schools, law enforcement and pharmacies.

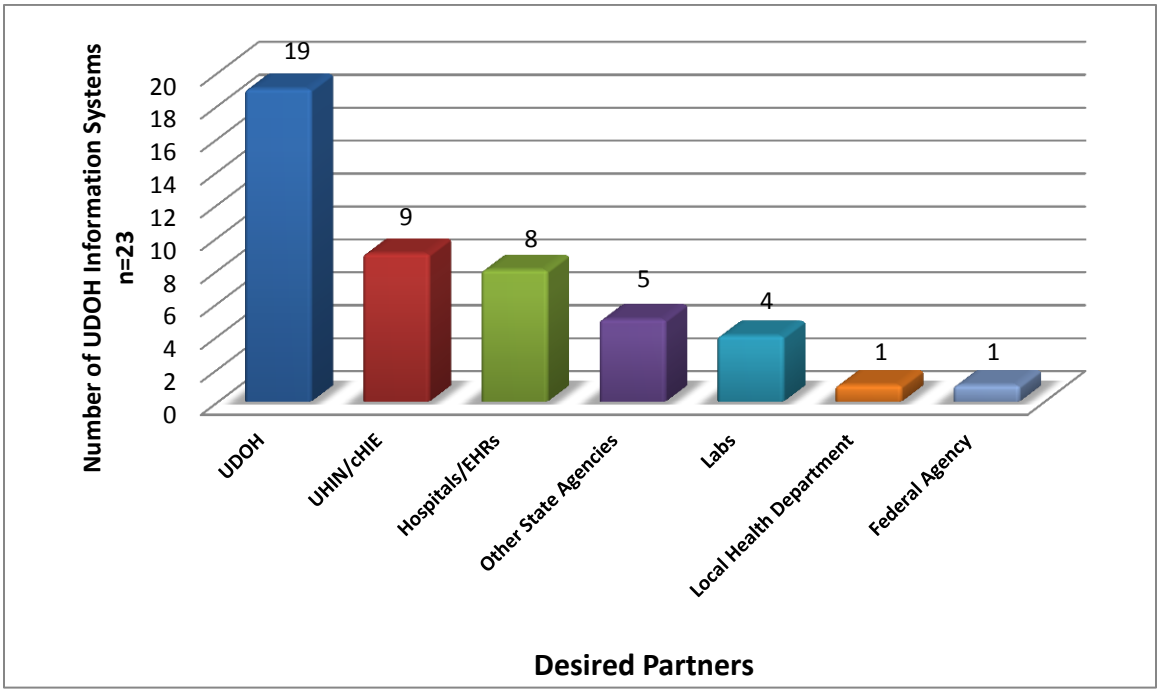
Figure 2: Current UDOH Information Exchange Partners



Desired Exchange Partners

Like UDOH's current exchange partners, there's a diverse range of *desired* exchange partners both internal and external to UDOH. The graph below denotes these desired exchange partners (either through better integration or interoperability with other systems). It's important to highlight that there is a great interest in better integration within UDOH and a desire for better interoperability with the cHIE. There are several UDOH projects that are currently exploring the use of the cHIE for various purposes, such as 1) assessing the cHIE's ability to calculate National Quality Forum (NQF) measures (18 and 59) 2) using the cHIE's infrastructure for death notification to external entities, and 3) the exchange of data from newborn hearing clinical reports from Intermountain's EHR through the cHIE's Direct service to deliver consolidated clinical document architecture (CCDA) messages to the Early Hearing Detection and Intervention (EHDI) Program . These innovative projects have the ability to demonstrate the value of the cHIE to public health and their external exchange partners.

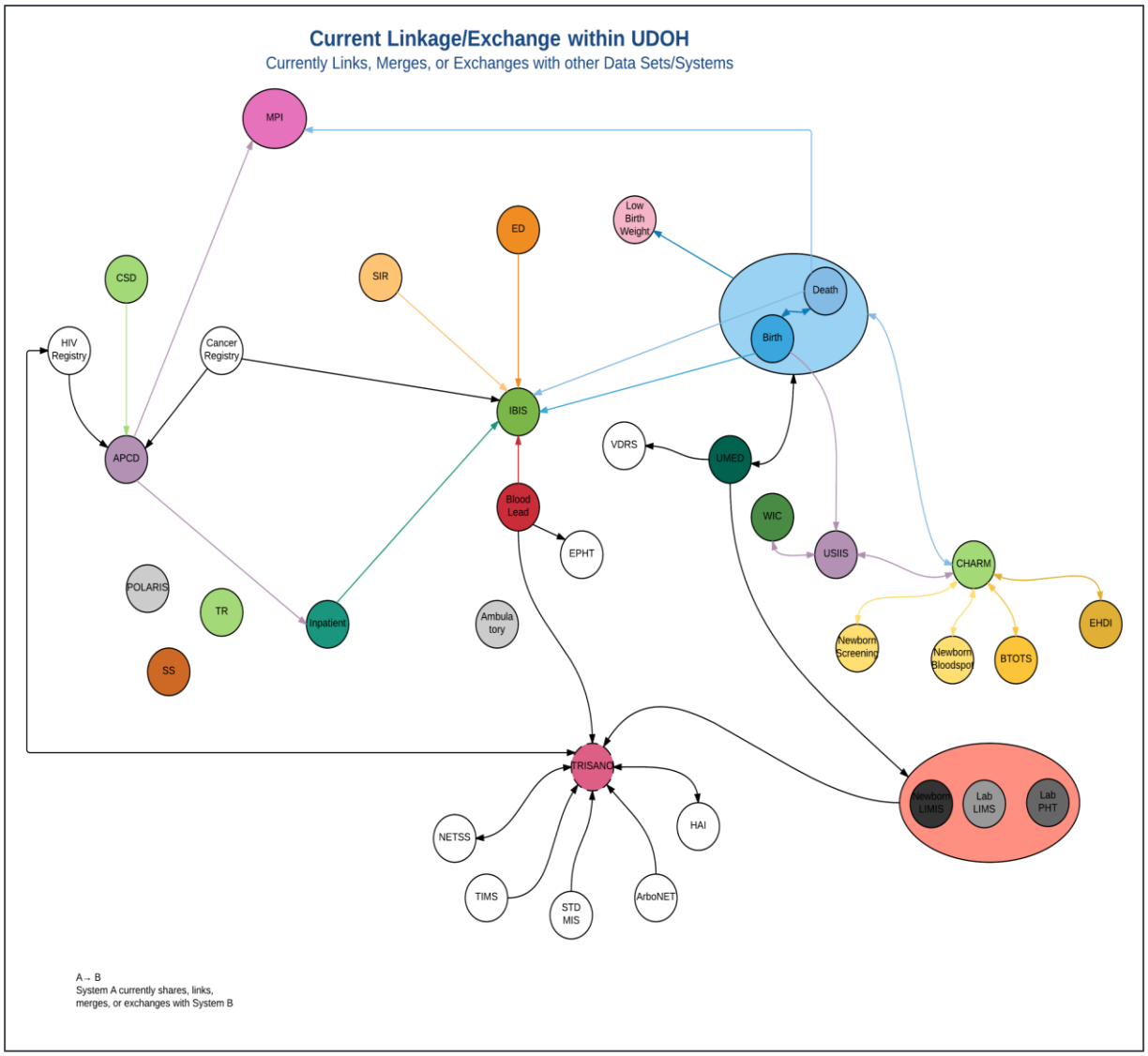
Figure 3: Desired Information Exchange Partners



Current Exchange within UDOH

Many UDOH systems link, merge or exchange data with other internal systems, with Vital Statistics being the most common system. The figure below depicts current efforts to link, merge, or exchange data with other UDOH systems.

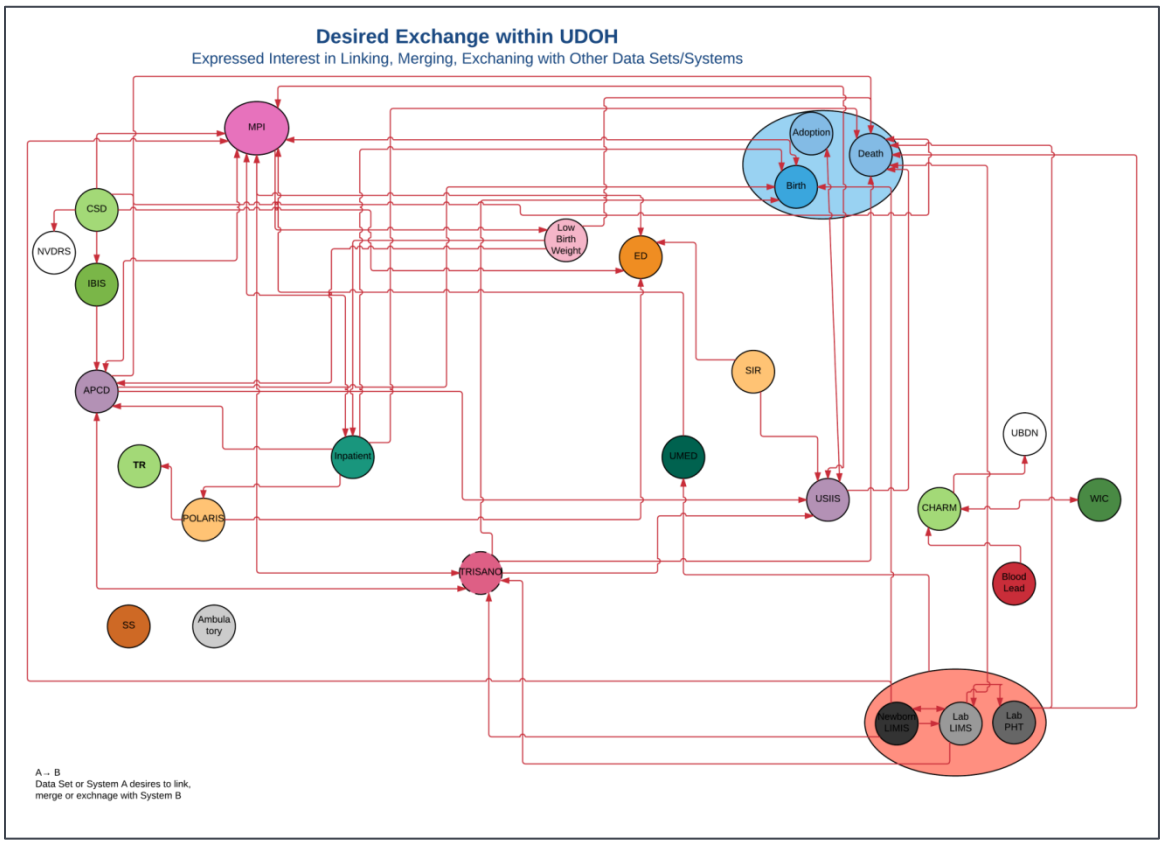
Figure 4: Current Information Exchange Partners within UDOH



Desired Exchange Partners within UDOH

While UDOH is already doing well with linking, merging, or exchanging data internally, there is still a strong desire of improving these exchanges, and also increasing this capability with more UDOH information systems. The figure below is a pictorial representation of the various UDOH systems and their expressed interest in being able to exchange information with other programs. There is interest at UDOH to being able to use the dohMPI to link and exchange data internally; however, few plans are in place to do so.

Figure 5: Desired Information Exchange Partners within UDOH



System Interoperability Assessment

Interoperability was categorized into current use and planned/capability levels for the systems in four incremental changes in interoperability based on the Center for Information Technology at the National Institutes of Health Four Levels of Data Interoperability[4]. It's important to note that the information reported is based on the interview self-assessment of the **current** system use and does not represent interoperability with future exchange partners. It's also important to note that the current use may not represent the capability of the system.

From the table below, it's evident that there is variability at UDOH as it relates to current system use interoperability levels. Some systems are currently operating at a high interoperability level and there are some who have plans at increasing their system's interoperability level in the near future. There are a few systems that expressed little interest in improving their interoperability status from a 3 to a 4.

UDOH System Interoperability Level	Current Use	Systems
Level 1 Non electronic data- No use of IT to share information Examples include paper, mail, and phone call.	0	
Level 2 Machine transportable data Examples include fax, email, and unindexed documents.	5	Emergency Department Encounter Database, Inpatient Hospital Discharges, Ambulatory Surgery Encounter Data, LAB-LIMS, LIMS-PHT, Newborn LIMS
Level 3 Machine Organizable Data Structured messages, unstructured content. Includes web-based interface and FTP uploads. Human action required.	12	APCD, Controlled Substance Database, IBIS, Low Birth Weight, Polaris/Image Trend, Student Injury Reporting System, Trauma Registry WIC, UINTAH, Blood Lead Registry[5], UMED

[4] Walker, Jan, et al. "The value of health care information exchange and interoperability." Health affairs 24 (2005): W5.
Te definition starts under "Analytic Framework" page W5-11
http://content.healthaffairs.org/content/early/2005/01/19/hlthaff.w5.10.full.pdf+html

[5] The Blood Lead registry has the capability of being at a level 4; however, it's use averages at a level 3.

Level 4 Machine interpretable Data Structured messages, standardized content No human action required.	6	CHARM, MPI, USIIS, TRISANO, Syndromic Surveillance Database, EDEN

Utilization of Standards

Standards related to both exchange and representation of data was gathered. Standards play an important role for data exchange between heterogeneous applications; the figure below highlights standards role as an important component of interoperability.

Figure 7: Components for Interoperability

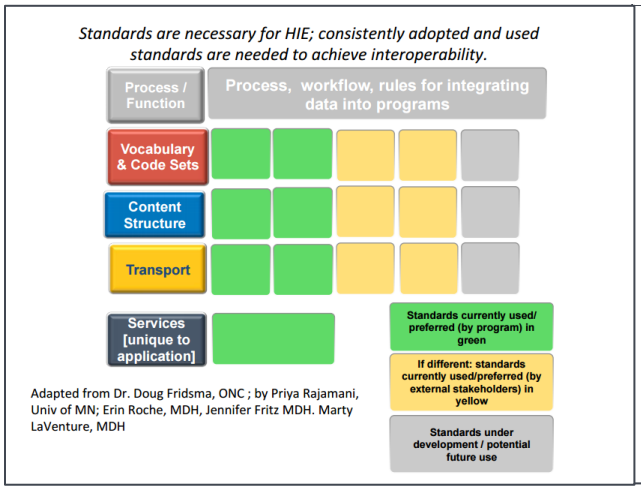
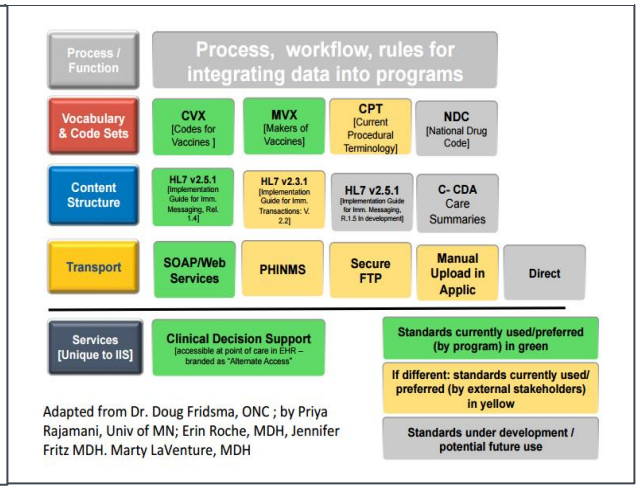


Figure 6: Components of Interoperability-The Immunization Example



At UDOH, 11(47.8%) of the systems assessed currently do not use a national data exchange standard when exchanging data with partners. In addition, 11 currently use HL7 v2 (9) or v 3 (2), and only two utilize (8.7%) PHIN-MS. The exchange standards were mostly used for lab, immunization, and death data.

While national standards for data exchange are not commonly use, national data representation standards for certain fields were being used by 20 of 23 systems. Of the 3 that do not use some sort type of national standards 1 system uses locally defined coded while two uses no national standards or codes.

Barriers to Exchange

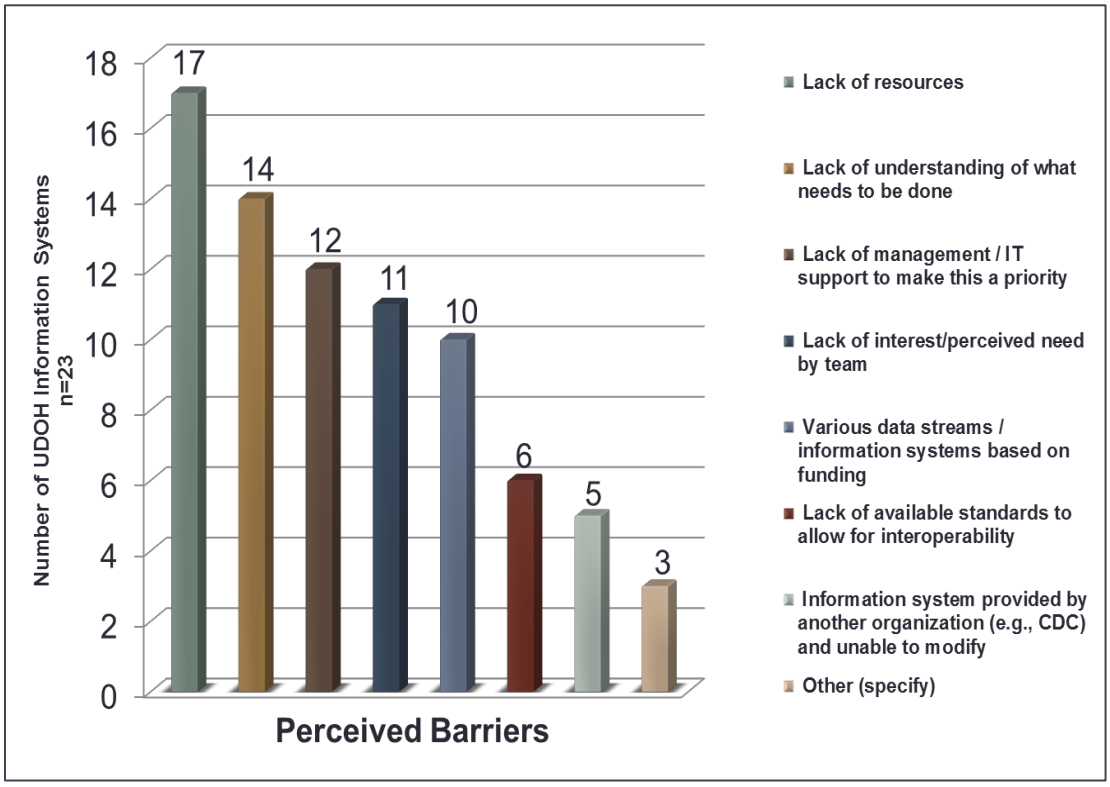
When discussing the barriers to being able to electronically exchange data the interviewees openly discussed these barriers and at times provided recommendations. 17 out of 23 system interviewee mentioned lack of resources as a barrier to efficient exchange of information—a list of these resources are discussed in the proceeding section. Other barriers mentioned frequently include:

- Lack of understanding of what needs to be done: nearly half of the systems interviewed stated that they are unaware of what needs to be done to be able to electronically exchange information at interoperability levels 3-4 with their exchange partners. This high rate identifies the need for improved communication and leadership across UDOH about agency plans and resources available for upgrading these systems, and it also identifies the need for a possibly new set of workforce skills that may be required of staff responsible for upgrading these systems.
- Lack of management/IT support to make this a priority: many interviewees felt that upper management, nor DTS, pushes the need for better interoperable systems.
- Lack of interest/perceived need by team: in the middle of perceived barriers, interviewees felt that due to the lack of understanding of what's needs to be done many of their and also lack of funding many team members while they see the value of easily exchanging data it is not a top priority for many. Frequently, this was due to competing priorities by the data steward rather than a lack of interest in improved exchange capabilities.
- Various data streams/information systems based on funding: nearly all the respondents the lack of funding as a major hindrance for improving data exchange and integration within UDOH.

Other barriers identified:

- Lack of available standards to allow for interoperability: this identified barrier was interesting, because as noted earlier, many of the systems use national standards. Therefore, it is evident that many do not know how data is represented across UDOH system, thus highlighting the need for more communications in this area.
- Information system provided by another organization: there were a few systems were the system was provided or a part of a consortium, thus making it difficult to modify.
- Other barriers worth highlighting include:
    - Lack of knowing what's available
    - hesitation due to security concerns and programs not understanding the value of interoperability
    - connection interfaces for each partners (would need a large number of external interfaces)
    - Lack of interoperability and difficulty coordinating with internal and external exchange partners (e.g., many silo systems that are not connected)
    - territorial Culture
    - Too many data sharing agreements

Figure 8: Barriers to Exchanging Information and Higher Interoperability Levels



Resources Needed

There were three categories of resources that were overwhelmingly identified by interviewees:

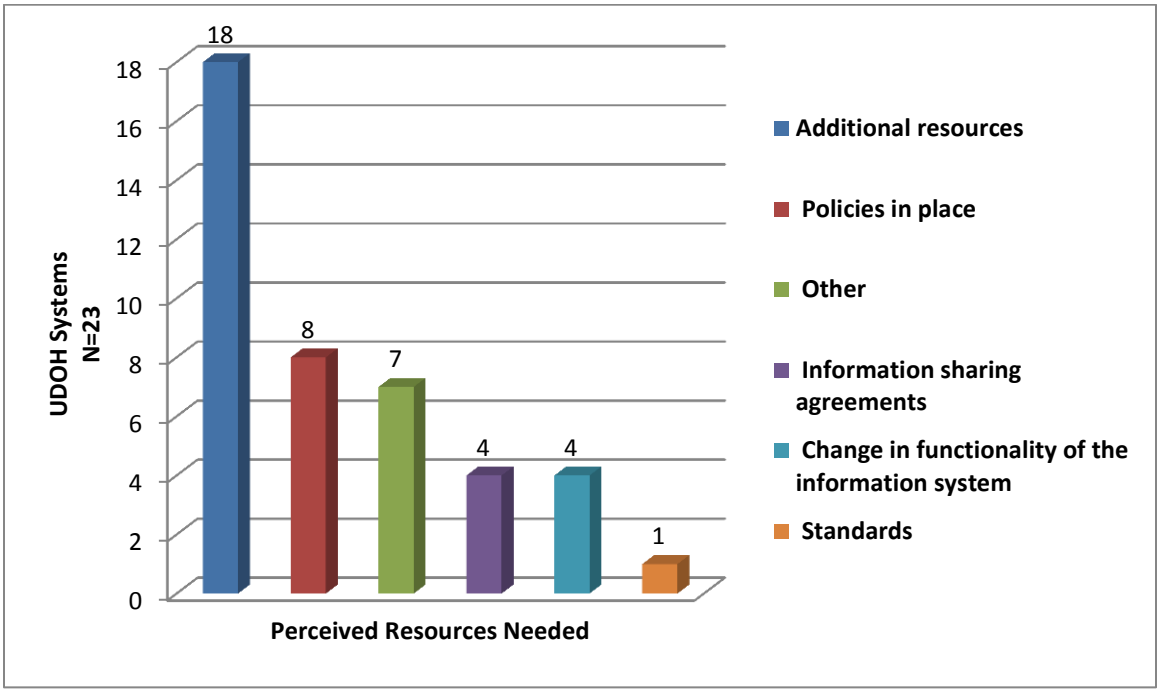
1. **Additional Resources**: many interviewees felt that hiring people with the appropriate skills to move this initiative [better data exchange and interoperability] forward; personnel includes:
    i. More **trained** informaticist to communicate with DTS and defining requirements
    ii. More developers to help with system modernization and building interfaces

    Closely following the need for appropriate personnel was the need for additional resources in form of funding.
2. The need for **well-defined policies** in place with regards to information exchanges was also identified as a needed resource. Many interviewees felt that knowing what data can be shared and with whom can ease the process of exchanging data to partners.
3. **Other resources identified**:
    i. Guided data model
    ii. An agency wide strategic plan for interoperability, coordinated unified approach,
    iii. An agency wide strategic plan for interoperability

iv. Staff with appropriate skills (relates to 1)
v. Clarification on who can access data (relates to 2)
vi. Department-wide commitment

It's important to highlight that, a small percentage of interviewees expressed information sharing agreements were a needed resource; however, as pointed about, many felt that there were too many data sharing agreements within UDOH, thus streamlining this process is important.

Figure 9: Resources Needed for Exchanging Information at Higher Interoperability Levels



NIEM Assessment

The NIEM Engagement Process (NEP) is a structured process to assess the NIEM readiness of organizations, systems or exchanges. This process focuses on analysis of 4 criteria – Business Need, Stakeholder Community Planning Process, and Technical Capability. Through a series of maturity valuations for the analysis criteria, a series of next steps (if applicable) are identified for true and realized NIEM readiness.

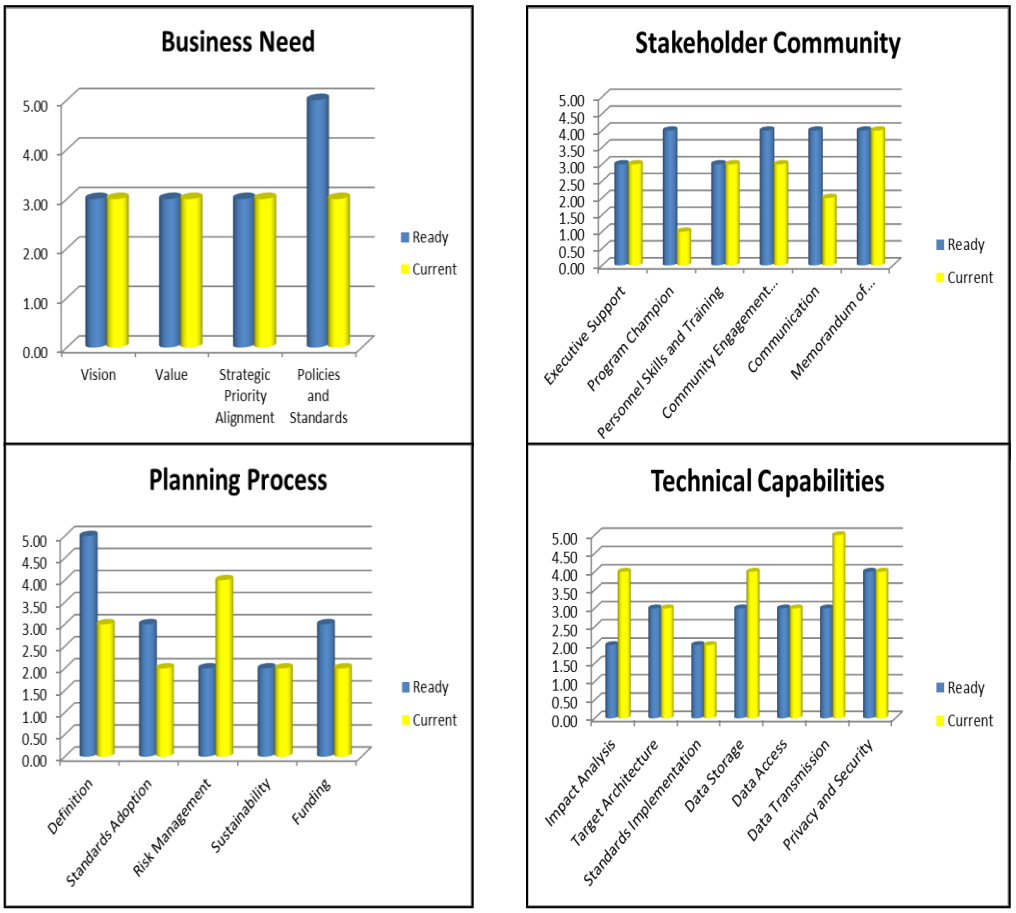
With data gathered, conducted an assessment using a modified version of National Information Exchange Model (NIEM) Readiness Assessment tool to quantify UDOH's readiness for systems interoperability and exchange. This process focuses on analysis of 4 criteria – Business Need, Stakeholder Community, Planning Process, and Technical Capability. The set of charts presented below are results from the NIEM readiness assessment. As depicted in the charts, NIEM readiness, as it would relate to the Business Need and Technical Capabilities, is at an acceptable maturity level. UDOH is at readiness level for Business Need and Technical Capabilities. Through the activities, many interviewees do see a business need for data exchange and interoperability, however, a clear

UDOH plan/strategy needs to be documented and shared with both internal and external stakeholders. The Planning Process and Stakeholder Community are two areas that are lacking, and where steps need to be taken to get to an acceptable state.

Figure 10: UDOH Interoperable Assessment Results

Overall Score	
Core Capability	Scores %
Business Need	90.00%
Stakeholder Community	75.00%
Planning Process	78.67%
Technical Capabilities	100.00%

>= 90%	Ready	Well-positioned to realize value of information sharing and exchange.
< 90%	Capable	Capable of realizing value, but improvements are needed to realize full potential.



V. RECOMMENDATIONS

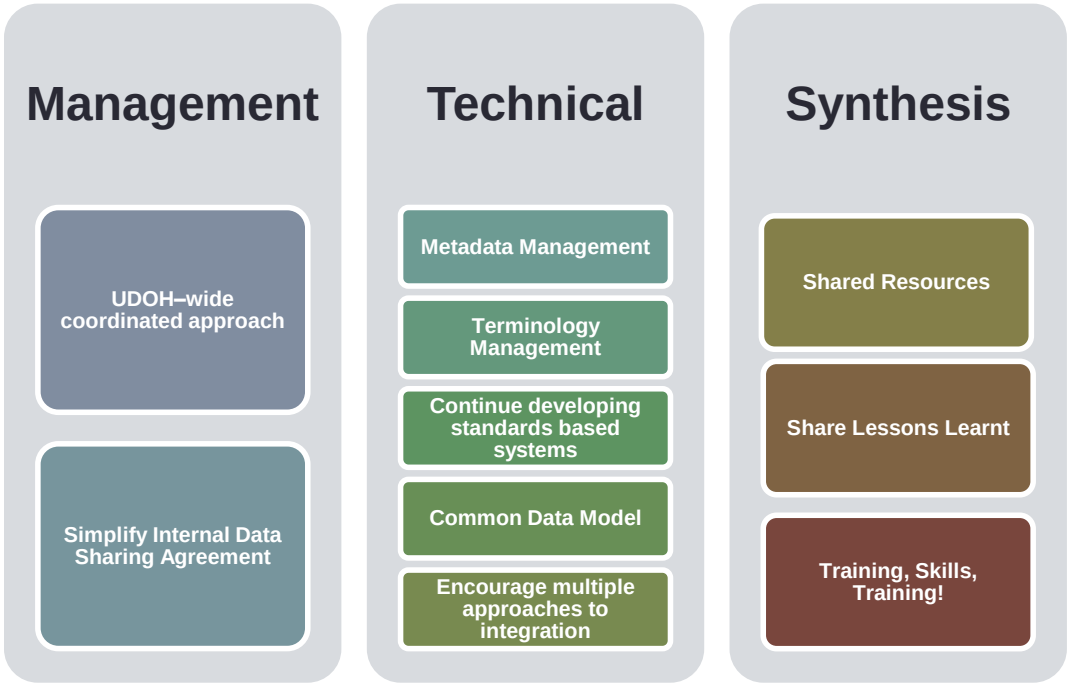
As a result of this assessment several agency-wide gaps have been identified; therefore, the proceeding section discusses a set of recommendations based on synthesis of the data to support the need for improving our exchange capacity with internal and external partners.

Highlights

1. UDOH –wide coordinated approach to promote better data integration and interoperability both internal and external exchange partners
    a. An agency-wide coordinated integration and interoperability plan
    b. Designation of lead personnel or a team to oversee integration and interoperability efforts at UDOH
2. Streamline internal data sharing agreements
3. Metadata Management
4. Terminology Management
5. Continue developing standards based systems
6. Develop UDOH common data model
7. Encourage support of multiple approaches to integration
8. Shared Resources
9. Share lessons learnt
10. Training, Skills, Training!

These highlights can be grouped into three categories that are depicted in figure below.

Figure 11: Categorization of Recommendations



To further view how these recommendations can aid interoperability, the table below discusses the recommendations based on the different drivers of interoperability.

Driver	Recommendation
Governance	UDOH should develop an overarching governance framework, and supporting work products, to guide decision-making and enable collaboration that promotes interoperability and data-exchange across the department. This framework would help establish authority and responsibility for sustained interoperability among the different bureaus, as well as identifying liaisons for DTS. UDOH is already unknowingly creating such a model with the establishment of the Change Management Committee (CMC) and Architectural, Standard (AST) committee. Appendix E is a potential governance model that can be implemented at UDOH. Fully implementing such a model would be a long term commitment
Legal and Confidentiality	Many interviewees expressed the overwhelming number of data sharing agreements needed to share data within UDOH. Many felt this process can be streamlined; one recommendation is the possibility of a department-wide agreement for Non-HIPPA or restricted data. Another recommendation was the potential of an online form/workflow[6].
Information Technology	UDOH systems utilize national messaging and vocabulary standards. Continued promotion and adoption of standards should be promoted. However, the challenge ahead is to inform and educate everyone at the state and county levels along with the vendor community about these standards and how they should be incorporated into projects and procurements. Also, the development of common data element vocabularies should be established. The success of the UDOH MPI and Provider registry will be crucial for more efficient and timely data linkage and integration. Therefore, data stewards and UDOH leadership should heavily promote the development, sharing, and use of these services that are to enable data exchanges.
Organizational Change Management	Throughout the assessment it was noted by interviewees that many data stewards are territorial of their data thus being an impediment to data exchange. Changing such attitude is hard. To move from such a culture would require the following: • Creating awareness of data integration and interoperability and

[6] Dr. Xu has been working with the Office of Health Data and Security to simplify the data sharing agreement process.

	how it can be beneficial to individual programs • Cultivate champions to communicate and market interoperability • Identify and prioritize behavior changes needed to realize interoperability, then provide supports to the individuals impacted by these changes The efforts above would require long-term commitment by UDOH interoperability champions as it cannot be completed within a short time frame; however, changing such attitudes and bridging silos would support rather than inhibit cross-sector collaboration.

Workforce Development	The assessment identified the need for more data support staff, developer and overwhelmingly more informaticists. As a result, many individuals interviewed expressed the need for more training in informatics-related courses, as well as cross training at the department specifically between the business analysts, DTS and business owners bridging an application domain (such as public health or medicine) with basic information sciences . This cross training is hoped to improve communication with key personnel when during an interoperability project. Training includes, but not limited to:
	1. Project Management
	2. Organizational behavior and management
	3. Vocabulary and Standards
	4. *Designing and Managing Public Health Information Systems*
	
	There's also ongoing training within the health department that would be useful to different bureaus. However, it seems many individuals are not aware of these training. Therefore, better communication to promote these opportunities within the health department is needed; perhaps an announcement at agency-wide meeting, such as the HIT Operational Council would be useful.
	
	Also, one of the more concrete ways individual programs can become prepared for better interoperability and integration of systems is to participate whenever possible on various national standards setting activities. Potential opportunities are listed below.
	• CDC (Centers for Disease Control and Prevention)
	  ○ http://www.cdc.gov
	  ○ Participate in CDC Community of Practice
	  ▪ PHIN (Public Health Information Network) Communities of Practice
	  • http://www.cdc.gov/phin/communities/phin-cop-descriptions.html
	• AMIA (American Medical Informatics Association)
	  ○ http://www.amia.org
	• Utilize educational opportunities on public health / population informatics
	  ○ University of Utah Biomedical Informatics Department
	  ○ Public Health Informatics Institute

	• Participate in AMIA Public Health Informatics Working Group
	  ○ http://mailman.amia.org/mailman/listinfo/phi-wg
	• Public Health Data Standards Consortium
	  ○ http://www.phdsc.org
	• Health Level 7 - one of several American National Standards Institute (ANSI) -accredited Standards Developing Organizations (SDOs) in the healthcare arena.
	http://www.hl7.org
	• HIMSS

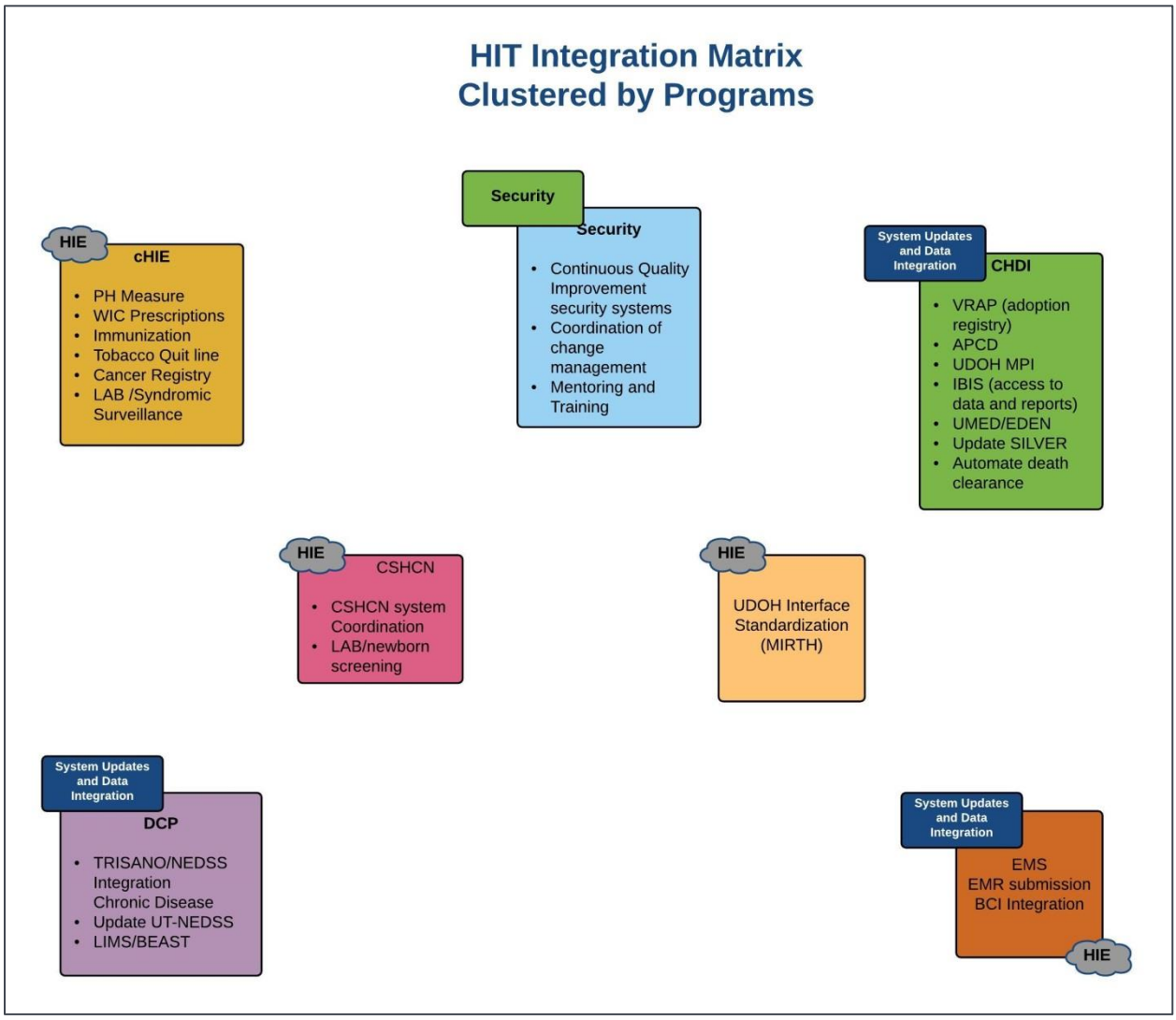
VI. Next Steps and Conclusion

The activities undertaken during this planning grant allowed the foundation to be laid for UDOH to begin the discussion of interoperable UDOH health systems. The data collected will be a valuable source for improving current operations and data project management, as well as a stepping stone to remove barriers that limits data sharing within the health department.

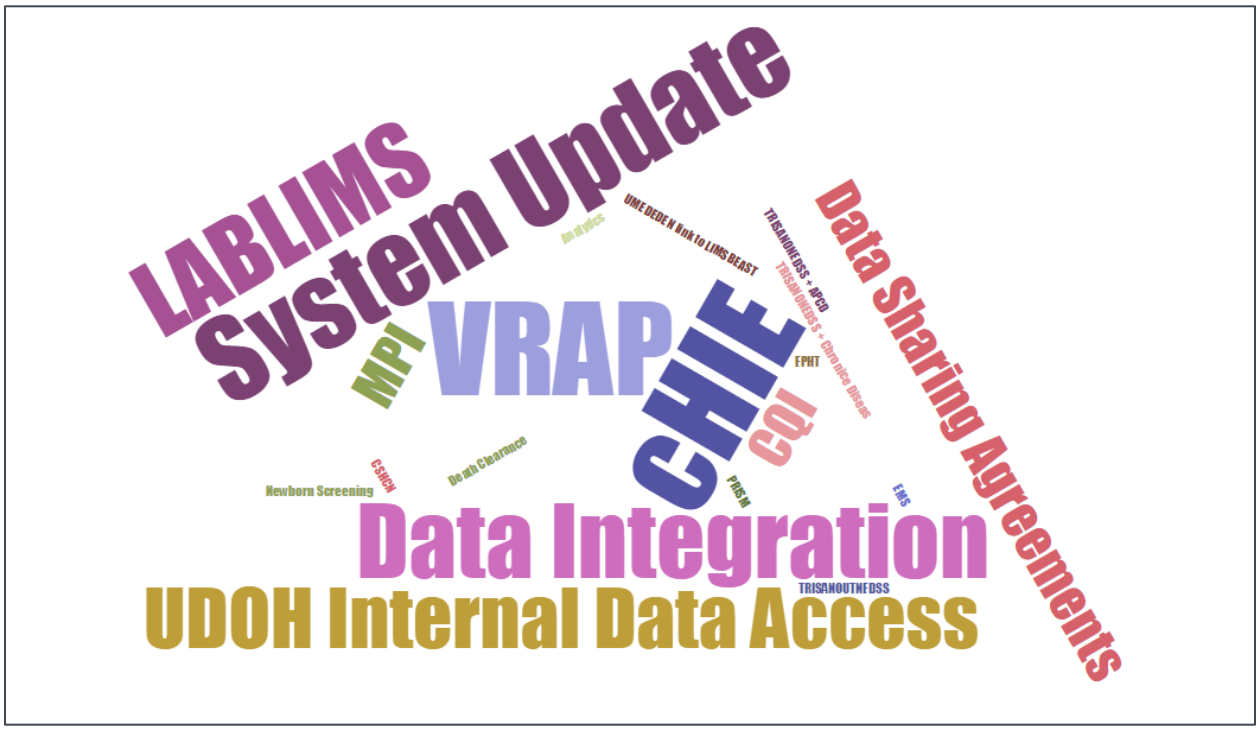
APPEND A: LIST OF SELECT SYSTEMS AT UTAH DEPARTMENT OF HEALTH

#	System by Division
Center for Health Data and Informatics	
1	All Payers Claims Database (APCD)
2	Emergency Department Encounter Database
3	Ambulatory data
4	Inpatient Data
5	Utah's Electronic Death Entry Network (EDEN/Death)
6	UHINTAH (Birth Registry)
7	Indicator-Based Information System (IBIS)
8	Master Patient Index (MPI)
Division of Control and Prevention	
9	Blood Lead Registry
10	Student Injury Reporting System
11	Trisano/Epi-Trax
12	Utah State Immunization Information Registry (USIIS)
13	Controlled Substance Database
14	Syndromic Surveillance Database
15	Newborn Screening Laboratory Information Management System (LIMS)
16	Lab-LIMS
17	LIMS-PHT
18	UMED
Division of Family Health and Preparedness	
19	Trauma Registry
20	Polaris/Image Trend
21	Low Birth Weight (REDCap)
22	WIC MIS (Women, Infants and Children Management Information System)
23	CHARM

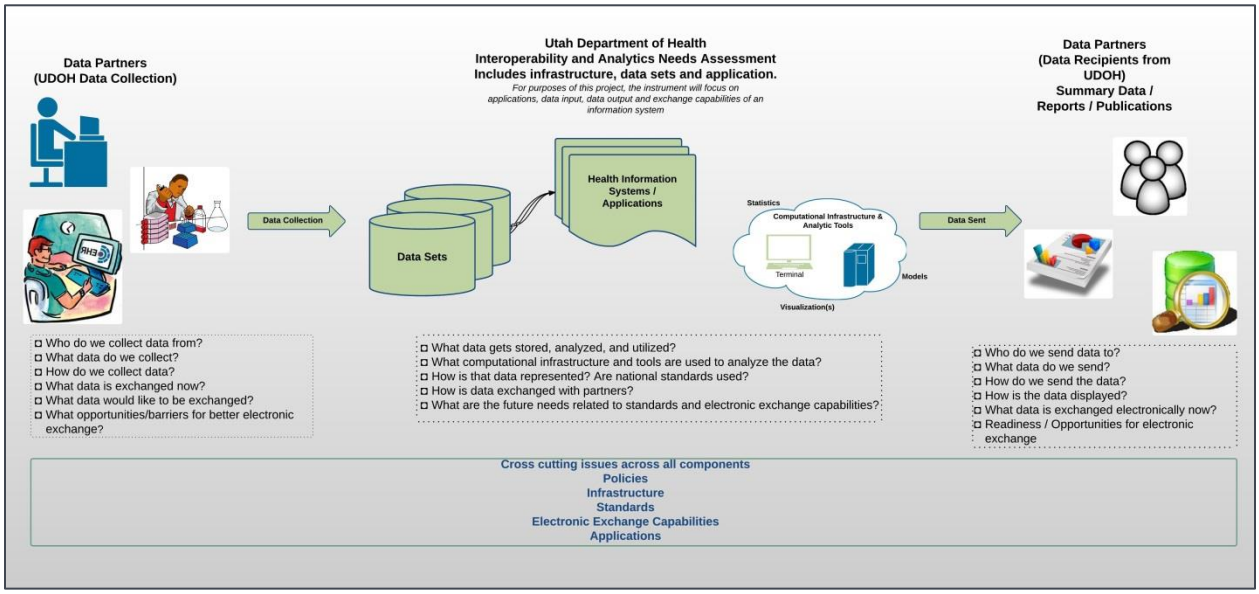
Appendix B: HIT Integration Matrix Clustered By Programs



Appendix C: Word Cloud of Requests Listed on the HIT Matrix



APPENDIX D: ASSESSMENT FRAMEWORK



APPENDIX E: PROPOSED GOVERNANCE MODEL

Governance Model – help guide decision-making, such as approval process for new IT systems modernization and simplifying internal data sharing agreements, and enable collaboration that promote interoperability and data-exchange across UDOH.